

CLAIMS

What is claimed is:

1. A telescopic tube locking device for multiple-section telescopic tubes, comprising:
 - a tube section, having an inside;
 - 5 a smaller tube section, slidably disposed within the tube section, configured to selectively extend from or retract into the tube section;
 - a clamping assembly, attached within the smaller tube section, having a locked position and a released position, the clamping assembly including
 - a ramp block, fixedly attached to the smaller tube section, the ramp block
 - 10 having a first ramp surface;
 - a release block, moveably disposed opposite the ramp block, having a second ramp surface opposite the first ramp surface; and
 - a roller, rollably disposed between the first and second ramp surfaces, configured to laterally spread the ramp block and release block to place the
 - 15 clamping mechanism in the locked position upon relative translation of the release block in a first direction; and
 - a release mechanism, configured to release the clamping assembly when (i) the release block is pushed in a direction opposite to the first direction, and (ii) the smaller tube section is pulled in a direction to extend it from the tube section.
- 20 2. A device in accordance with claim 1, further comprising:
 - a larger tube section, disposed around the tube section;
 - a second clamping mechanism, associated with the larger tube section, having a second release block, a locked position, and a released position;
 - 25 a release extension, associated with the release block, configured to contact the second release block, so as to release the second clamping mechanism and allow sequential retraction of the tube section into the larger tube section following retraction of the smaller tube section into the tube section.
- 30 3. A device in accordance with claim 1, wherein the roller is selected from the group consisting of substantially cylindrical rollers, substantially spherical rollers, rollers having an eccentric cylindrical cross-section, cylindrical rollers with gear-type teeth, eccentric cylindrical rollers with gear-type teeth, rocker plates, and a hinge plate pivotally interconnecting the ramp block and release block.

4. A device in accordance with claim 1, wherein the roller is substantially spherical, and the first and second ramp surfaces comprise tapered slots, configured to receive the spherical roller.

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5. A device in accordance with claim 1, wherein the roller comprises gear-type teeth, and the first and second ramp surfaces comprise gear-type teeth configured to intermesh with the teeth of the roller.

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6. A device in accordance with claim 1, wherein at least one of the first and second ramp surfaces are non-angled with respect to the telescopic tubes.

7. A device in accordance with claim 1, wherein the roller comprises at least two rollers, each roller being disposed between opposing ramp surfaces.

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8. A device in accordance with claim 1, wherein the roller has an eccentric cross-section configured to produce a cam-type action between the ramp surfaces when rotated.

9. A device in accordance with claim 8, wherein the roller comprises gear-type teeth, and the first and second ramp surfaces comprise gear-type teeth configured to intermesh with the teeth of the roller.

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10. A device in accordance with claim 8, wherein the ramp block and release block include a pocket for holding opposing edges of the roller.

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11. A telescopic tube locking device for multiple-section telescopic tubes including a larger tube section having an inside, and a smaller tube section slidably disposed within the larger tube section and configured to selectively extend from or retract thereinto, the locking device comprising:

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a ramp block, fixedly attached within the smaller tube section, the ramp block having a first ramp surface;

a release block, moveably disposed against the inside of the larger tube section opposite the first ramp block, the release block having a second ramp surface; and

a roller, disposed between the first and second ramp surfaces, the ramp block and release block being configured such that relative longitudinal translation thereof moves the roller so as to either (i) press the release block in a locking direction laterally away from the ramp block and against the inside of the larger tube section to lock the smaller tube section therein, or (ii) allow the release block to move in a release direction laterally toward the ramp block, so as to reduce pressure on the release block and allow sliding of the smaller tube section within the larger tube section.

12. A device in accordance with claim 11, further comprising a push rod, slidably disposed within the smaller tube section, configured to contact the first release block to push it in the release direction.

13. A device in accordance with claim 11, wherein the multiple-section telescopic tube includes a largest tube section disposed around the larger tube section, the locking device further comprising:

a second ramp block, fixedly attached within the larger tube section, the second ramp block having a third ramp surface;

a second release block, moveably disposed against an inside surface of the largest tube section opposite the second ramp block, the second release block having a fourth ramp surface;

a second roller, disposed between the third and fourth ramp surfaces, the second ramp block and second release block being configured such that relative longitudinal translation thereof moves the roller so as to either (i) press the second release block in a locking direction laterally away from the second ramp block and against the inside of the largest tube section to lock the larger tube section therein, or (ii) allow the second release block to move in a release direction laterally toward the second ramp block, so as to reduce pressure on the second release block and allow sliding of the larger tube section within the largest tube section; and

a release extension, associated with the release block, configured to contact the second release block, so as to allow sequential retraction of the larger tube section into the largest tube section following retraction of the smaller tube section into the larger tube section.

14. A device in accordance with claim 11, wherein the roller is selected from the group consisting of substantially cylindrical rollers, substantially spherical rollers, rollers having an eccentric cylindrical cross-section, cylindrical rollers with gear-type teeth, eccentric cylindrical rollers with gear-type teeth, rocker plates, and a hinge plate pivotally interconnecting the ramp
5 block and release block.

15. A device in accordance with claim 14, wherein the roller comprises an eccentric cross-section cylindrical roller or a rocker plate, and the ramp block and release block include a pocket for holding opposing edges of the roller.
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16. A device in accordance with claim 15, wherein the roller comprises gear-type teeth, and the first and second ramp surfaces comprise gear-type teeth configured to intermesh with the teeth of the roller.

17. A device in accordance with claim 11, wherein at least one of the first and second ramp surfaces are non-angled with respect to the telescopic tubes.
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18. A device in accordance with claim 11, wherein the roller comprises at least two rollers, each roller being disposed between opposing ramp surfaces.
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19. A locking device for multiple-section telescoping tubes including a smaller tube that is telescopically retractable into or extensible from within a larger tube, comprising:
a pair of opposing blocks, disposed within the telescoping tubes, one block of the pair being attached to the smaller tube, the other block of the pair being configured to
25 move laterally with respect to the aforementioned block when the blocks are moved longitudinally with respect to each other, so as to (i) cause one block to bear against an inner side of the larger tube to resist retraction of the smaller tube, and (ii) allow the blocks to move away from the inner side of the larger tube to allow free sliding extension of the smaller tube; and
30 means for selectively longitudinally moving one of the blocks with respect to the other, so as to selectively allow free sliding retraction of the smaller tube.

20. A locking device in accordance with claim 19, wherein the means for selectively longitudinally moving one of the blocks comprises a push rod, slidably disposed within the

smaller tube, configured to contact one of the blocks to cause the blocks to move away from the inner side of the larger tube.